

# ECON42720 Causal Inference and Policy Evaluation

## 0 Housekeeping

Ben Elsner (UCD)

## Causal questions are everywhere

Does a higher income tax rate reduce inequality?

Does a new drug improve health outcomes?

Does a new training program improve employment outcomes?

Does raising interest rates reduce inflation?

Does going to the gym make you healthier?

# Answering causal questions

The “hard” sciences answer causal questions by conducting experiments

But experiments are not always possible

- ▶ Ethical concerns
- ▶ Practical concerns
- ▶ Financial constraints
- ▶ etc

# This module: causal inference without experiments

We will learn how to answer causal questions using observational data

What we need for that:

- ▶ knowledge of statistics
- ▶ theory of causal inference
- ▶ understanding of best practices in the social sciences
- ▶ programming skills to implement methods

# This module: causal inference without experiments

## What we will cover

- ▶ Introduction to causal inference
- ▶ The most important causal research designs
- ▶ Applications of causal inference methods

## What we will NOT cover

- ▶ Causal machine learning (but: references available on request)
- ▶ Causal discovery and other alchemy

# Course Page & Brightspace

All materials and the syllabus are available on the **Course Page**

**Brightspace** will be used for

- ▶ Announcements
- ▶ Answering questions in the Forum

# Topics Covered in this Course

1. Foundations of Causality: DAGs
2. Econometrics Recap
3. Randomised experiments and potential outcomes
4. Matching and inverse probability weighting
5. Instrumental variables
6. Regression Discontinuity
7. Difference-in-differences
8. Synthetic control

## Two Main Textbooks

**Cunningham, Scott. Causal Inference: The Mixtape.** Yale University Press, 2021.  
Free html version at <https://mixtape.scunning.com/>

**Huntington-Klein, N. (2021). The Effect: An Introduction to Research Design and Causality (1st ed.).** Chapman and Hall/CRC. Free html version at <https://theeffectbook.net/>.



## Other Textbooks

**The classic:** Angrist, J. and J.-S. Pischke (2009). *Mostly Harmless Econometrics*. Princeton University Press.

**Simple intro:** Angrist, J. and J.-S. Pischke (2014). *Mastering 'Metrics*. Princeton University Press.

**For the cool kids:** Huber, M. (2023). *Causal Analysis: Impact Evaluation and Causal Machine Learning with Applications in R*. MIT Press. Free e-book version available online at <https://mitpress.ubli.sh.com/ebook/causal-analysis-impact-evaluation-and-causal-machine-learning-with-applications-in-r-preview/12759/Cover>

**Intro to data analysis:** Békés, G. and G. Kézdi (2021). *Data Analysis for Business, Economics, and Policy*. Cambridge University Press.

# Prerequisites

(Frequentist) **Statistics**: estimation and inference (undergrad level)

**Econometrics**: multivariate regressions and panel regressions

**Programming**: you must be able to write code in R

That's it really! More important: curiosity and willingness to learn new things

# Sessions

We meet every Thursday, 9-11am, G70-NEWST

Sessions will be a mix of

- ▶ theory lectures
- ▶ “lab” sessions (with laptops)

I will tell you before when to bring laptops

# Software

Please install the following **software on your computer**:

- ▶ **Programming**: R and R Studio
- ▶ **Word processing**: Quarto (optional)
- ▶ **Version control**: Github desktop or alternative

# Asking Questions

**Questions that have no confidential content** can be asked in the **Brightspace Forum**

- ▶ This concerns 90% of questions about material or logistics
- ▶ I will answer questions in the forum
- ▶ You can email me and I will post on the forum without mentioning your name

**Questions with confidential content** should be asked via **email**

- ▶ These are questions that are specific to you
- ▶ Examples: accommodation of disability, illness, personal circumstances

# Assessment

**Final exam:** 60% of final grade

**Assignments:** 40% of final grade

- ▶ First assignment given in week 4
- ▶ Second assignment around week 9

Details about assignments will be given closer to the time

# AI Policy

You can use AI for the assignments

ChatGPT and Github Co-pilot work well for R. Github Co-pilot is free for students.

But use it with caution

If you use AI, add a statement that explains briefly how you used it



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## Contact

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